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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/837,480	04/19/2001	Hiromichi Nakata	10517/94	7265

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EXAMINER	
DOVE, TRACY MAE	
ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 10/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/837,480	NAKATA ET AL.	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-14 and 16-46* is/are pending in the application.

4a) Of the above claim(s) *27-42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-14,16-26,43 and 45* is/are rejected.

7)☒ Claim(s) *44 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/30/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *IDS 8/6/04*.

DETAILED ACTION

This Office Action is in response to the communication filed on 7/30/04. Applicant's arguments have been considered, but are moot in view of the new grounds for rejection. Claims 1, 2, 4-14 and 16-46 are pending. Claims 3 and 15 are canceled. Claims 27-42 are withdrawn as being directed toward a nonelected invention.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 7/30/04 has been considered by the examiner. The IDS filed on 8/6/04 is a duplicate copy of the IDS filed on 7/30/04, which has already been considered by the examiner.

Double Patenting

A divisional application (10/829,984) of the present application (09/837,480) has been filed. Withdrawn claims 27-42 of the present application and claims 1-16 of the divisional application are claiming common subject matter. A double patenting rejection has not been made because the claims are withdrawn. However, the examiner suggests claims 27-42 be canceled in response to this Action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4-13 and 16-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over, Kaneko et al., US 6,383,678, in view of Cullity, Elements of X-ray Diffraction, 2nd edition.

Kaneko teaches a separator for a fuel cell that provides a path for a fuel gas or an oxidative gas to an electrode (fluid flow path). As shown in Figure 10, the separator 220 comprises a metal plate 222 (base material), a metal plating layer 228 (metal coating layer) and a conductive coating 223 (corrosion-resistant layer). The conductive coating membrane coats the conductive metal plate where the separator contacts the electrode (region associated with electrical contact resistance). See abstract. Metal plating layer 228 is a tight layer that is heat softened. The heat softened (melted) metal plating layer 228 is a plated layer on the conductive metal plate 222. The metal plating has a high conductivity and is made of a metal, such as tin or nickel, which is easily softened at a lower temperature than the conductive metal plate 222 (7:27-60). The conductive coating layer is rust resistant (8:22-32) and comprises carbon, a precious metal or an alloy of nickel and chromium (1:64-67). The fuel cell includes a plurality of unit cells including the separator 220 (8:13-20).

Kaneko does not explicitly state the metal coating layer has crystal grains having an average grain size of 0.1 mm or more.

However, Cullity teaches the size of the crystal grains in a crystalline metal or alloy has pronounced effects on many of the metal or metal alloy properties (strength, hardness). The dependence of properties on grain size makes the measurement of grain size a matter of some importance in the control of most metal forming operations. The grain sizes encountered in commercial metals and alloys range from about 1000 to 1 μm (bottom of page 281-top of page 282).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill in the art would have known

that the metal layer of Kaneko would have had a grain size of 1000-1 μm because this is a typical grain size encountered in commercial metals and metal alloys. Furthermore, the instant specification states the large crystal grain size of the metal plating layer of the present invention results from a melting process (page 21). The metal plating layer of Kaneko is heat softened, which contributes to the "tight" metal plating layer. Thus, Kaneko at least suggests that the metal plating layer has an average grain size of 0.1 mm or more. Both the instant invention and Kaneko teach a tin metal coating for a fuel cell separator.

Kaneko does not explicitly state the metal plating layer is subjected to melting and gradual cooling. However, the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. In re Fessman. Kaneko teaches a heat softened metal plating layer.

Regarding claims 5, 7, 8, 17, 19 and 20, Kaneko does not explicitly teach a metal plating layer comprising a tin alloy.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Kaneko teaches the metal plating layer has a high conductivity and is made of a metal which is easily softened at a lower temperature than the conductive metal plate, such as tin (7:49-52). One of skill would have been motivated to use a tin alloy having a lower melting point than tin because such an alloy is easily softened compared to tin metal. Kaneko at least suggests using metal or metal alloys that are easily softened at a lower temperature than the conductive metal plate. Furthermore, Kaneko has a specific teaching to use tin. A tin alloy metal plating layer having a lower melting point than tin

would have been obvious to one of skill in view of the teaching by Kaneko to use an easily softened tin metal plating layer.

*

Claims 1, 2, 4, 13, 14, 16, 25, 26, 42 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over, Hwang et al., US 6,090,228 in view of Cullity, Elements of X-ray Diffraction, 2nd edition.

Hwang teaches an anticorrosive treatment method for a separator of a fuel cell. Conventional anticorrosive treatment methods for the separator include a molten metal (aluminum) coating. Hwang teaches nickel (underlying coating layer) and aluminum are coated in turn on a base material of stainless steel. See abstract. The separator provides entry and exits of reaction gases (fluid flow paths) and an electric current path (col. 1, lines 37-38). The separator contacts an electrode of the fuel cell (Fig. 1). It is well known to coat the separator with aluminum by dipping a base material into molten aluminum (col. 1, lines 58-63).

Hwang does not explicitly teach the metal coating layer comprises crystal grains having an average grain size of 0.1mm or more.

However, Cullity teaches the size of the crystal grains in a crystalline metal or alloy has pronounced effects on many of the metal or metal alloy properties (strength, hardness). The dependence of properties on grain size makes the measurement of grain size a matter of some importance in the control of most metal forming operations. The grain sizes encountered in commercial metals and alloys range from about 1000 to 1 μm (bottom of page 281-top of page 282).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill in the art would have known that the metal layer of Hwang would have had a grain size of 1000-1 μm because this is a typical grain size encountered in commercial metals and metal alloys. Furthermore, the instant specification states the large crystal grain size of the metal layer of the present invention results from a melting process (page 21). The metal layer of Hwang is molten (melted). Thus, Hwang at least suggests that the metal plating layer has an average grain size of 0.1 mm or more.

Hwang does not explicitly state the metal plating layer is subjected to melting and gradual cooling. However, the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. In re Fessman. Hwang teaches a molten metal. Note claims 42 and 45 also contain product-by-process limitations.

Response to Arguments

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection. The 35 U.S.C. 112, 1st, rejection has been withdrawn because the claim limitation rejected as new matter has been deleted. The 35 U.S.C. 103(a) rejection in view of Yoshimura (US6,291,094) has been withdrawn because Yoshimura is not available as prior art under 35 U.S.C. 103 against the claimed invention.

Allowable Subject Matter

Claims 44 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the claims are directed toward a fuel cell separator having a base material. The base material has a metal coating layer comprising crystal grains having an average grain size of 0.1 mm or more. The separator further includes an underlying coating layer formed between the metal coating layer and the base material wherein the underlying coating layer has an alloy-plating layer formed thereon. The layers of the claimed separator are as follows (in this order): base material layer, underlying coating layer, alloy-plating layer and metal coating layer comprising crystal grains having an average grain size of 0.1 mm or more.

The prior art does not teach a fuel cell separator having a base material with a metal coating layer formed thereon wherein the separator further includes an underlying coating layer formed between the metal coating layer and the base material and an alloy plating layer formed on the underlying coating layer.

Kaneko teaches a fuel cell separator having a base material with a metal plating layer formed thereon. However, Kaneko does not teach the fuel cell separator further includes an underlying metal coating layer formed between the metal plating layer and the base material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tracy Dove
Patent Examiner
Technology Center 1700
Art Unit 1745

October 14, 2004